**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE:\_\_\_\_\_\_\_\_\_\_ PER. \_\_\_\_**

**Using a Compound Light Microscope**

**Introduction**

Many objects are too small to be seen by the eye alone. They can be seen, however, with the use of an instrument that magnifies, or visually enlarges, the object. One such instrument, which is of great importance to biologists and other scientists, is the compound light microscope. A compound light microscope consists of a light source or mirror that illuminates the object to be observed, an objective lens that magnifies the image of the object, and an eyepiece (ocular lens) that further magnifies the image of the object and projects it into the viewer's eye.

Objects, or specimens, to be observed under a microscope are generally prepared in one of two ways. Prepared or permanent slides are made to last a long time. They are usually purchased from biological supply houses. Temporary or wet-mount slides are made to last only a short time-usually one laboratory period.

The microscope is an expensive precision instrument that requires special care and handling. In this investigation, you will learn the parts of a compound light microscope, the functions of those parts, and the proper use and care of the microscope. You will also learn the technique of preparing wet-mount slides.

**Problem**

What is the proper use of a compound light microscope?

**Pre-Lab Discussion – Read the entire lab and then answer the following questions.**

**1.** Why might it be a good idea to keep your microscope at least 10cm from the edge of the table?

2. Why should a microscope slide and coverslip be held by their edges?

3. Why do scientists use microscope?

4. Why should you use lens paper only once?

5. Why is it important to eliminate air bubbles from the slide?

**Materials** *(per partner)*\_

1 - compound light microscope,

1 - Allium Root Tip (Onion Root tip) Mitosis slide

lens paper

small piece magazine

letter “e” from the newspaper

microscope slide coverslip

dissecting probe

pipette

scissors

white paper

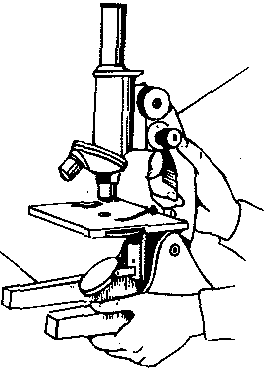
colored pencils

petri dishes

**Procedure**

**PART A. CARE OF THE COMPOUND LIGHT MICROSCOPE**

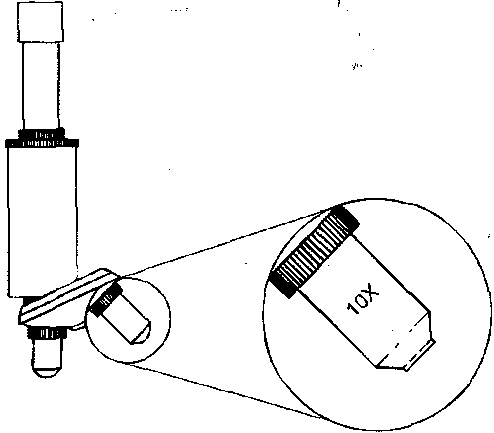
**1.** Figure 1shows the proper way to carry a microscope.



**FIG 1.**

Always carry the microscope with both hands. Grasp the arm of the microscope with one hand and place your other hand under the base. Always hold the microscope in an upright position so that the eyepiece cannot fall out. Place a microscope on your worktable or desk at least 10cm from the edge. Position the microscope with the arm facing you.

**2.** Notice the numbers etched on the objectives. Each number is followed by an "X" that means "times." For example, the low-power objective may have the number "4/0.1" on its side, as shown in Figure 2.



**FIG 2.**

That objective magnifies an object 4X (times) its normal size. Record the magnifications of your microscope in the Data Table. The total magnification of a microscope is calculated by multiplying the magnification of the objective by the magnification of the eyepiece (10X). For example:

Magnification of magnification of Total

ocular/eyepiece X Objective = magnification

10X X 4 X = 40X

Use the formula to complete the Data Table.,

|  |  |  |  |
| --- | --- | --- | --- |
| **Objective** | **Magnification of Objective** | **Magnification of Eyepiece** | **Total**  **Magnification** |
| Low power |  |  |  |
| High power |  |  |  |
| Other |  |  |  |

**TABLE 2 – Total Magnification of a Compound Light Microscope**

4. Before you use the microscope, clean the lenses of the objectives and eyepiece with lens paper. **Note:** *To avoid scratching the lenses, never clean or wipe them with anything other than*

*lens paper. Use a new piece of lens paper on each lens you clean. Never touch a lens with your finger. The oils on your skin may attract dust or lint that could scratch the lens.*

**PART B. USE OF A COMPOUND LIGHT MICROSCOPE**

**1.** Look at the microscope from the side. Locate the coarse adjustment knob that moves the objectives up and down. Practice moving the coarse adjustment knob to see how it moves the objectives with each turn.

2. Turn the coarse adjustment so that the low-power objective is positioned about 3 cm from the stage. Locate the revolving nosepiece. Turn the nosepiece until you hear the medium power (yellow band) click into position. See Figure 3. When an objective clicks into position, it is in the proper alignment for light to pass from the light source through the objective into the viewer’s eye.

3. Now, turn the nosepiece until the low-power objective clicks back into position.

**Note:** *Always look at the microscope from the side when moving an objective so that the microscope does not hit or* *damage the slide.*



**High power objective**

**Fig. 3**

3. Plug in your microscope and turn on the light. Look through the eyepiece. Adjust the diaphragm to permit sufficient light to enter the microscope. The white circle of light you see is the field of view

4.Place a prepared slide on the stage so that it is centered over the stage opening. Use the stage clips to hold the slide in position. Turn the low-power objective into place. Look at the microscope from the side and turn the coarse adjustment so that the low-power objective is as close as possible to the stage without touching it.

5. Look through the eyepiece and turn the coarse adjustment to move the low-power objective until the object comes into focus.

6. Use the fine adjustment to bring the object into sharp focus (resolution). You may wish to adjust the diaphragm so that you can see the object more clearly.

7. Draw what you see in the microscope on both low & high powers. Use your cell diagramming notes to prepare your diagrams.

8. Look at the microscope from the side and rotate the nosepiece until the high-power objective clicks into position.

9. Look through the eyepiece. Turn the fine adjustment to bring the object on the slide into focus.

10. Draw ONE CELL only under high power – refer to your cell diagramming notes.

**CAUTION: *NEVER USE THE COARSE ADJUSTMENT WHEN FOCUSING THE HIGH-POWER OBJECTIVE LENS. THIS COULD BREAK YOUR SLIDE OR DAMAGE THE LENS.***

11. Remove the slide. Move the low-power objective into position.

**Part C. Preparing a Wet Mount**

1.Use a pair of scissors to cut a letter "e" from a piece of newspaper. Cut out the smallest letter "e" you can find. Using tweezers, position the "e" upright on the center of a clean glass slide. See Figure 4A.

2. Use a pipette to place one drop of water on the cut piece of newspaper. See Figure 4B.



3. Hold a clean coverslip in your fingers as shown in Figure 4C. Use a dissecting probe to slowly lower the coverslip onto the wet newspaper. Slowly lowering the coverslip prevents air bubbles from being trapped between the slide and the coverslip. The type of slide you have just made is called a **wet mount**.

4. Center the wet mount on the stage with the letter "e" in its normal upright position.

Turn the low-power objective into position and bring the "e" into focus.

5. Make a drawing of “e” on low power using your cell diagramming notes. Remember to record the magnification.

7. While looking through the eyepiece, move the slide to the left. Notice the way the letter seems to move. Now move the slide to the right. Again notice the way the letter seems to move. Move the slide up and down and observe the direction the letter moves.

8. Turn the high-power objective into position and bring the letter "e" into focus. Remember to use only the fine focus!!!

9. Make a drawing of your “e” on high power using your cell diagramming notes. Remember to record the magnification.

10. Take apart the wet mount. Clean the slide and coverslip with soap and water. Carefully dry the slide and coverslip with paper towels and return them to their boxes.

11. Repeat steps 1 – 10 for a piece of magazine paper (BE SURE TO USE A COLORFUL PIECE). For the magazine, you will draw on **LOW & MEDIUM POWERS!**

12. Rotate the low-power objective into position and use the coarse adjustment to lower the stage all the way down. Carefully pick up the microscope and return it to its storage area.

13. Clean up your laboratory area and put away all tools.

14. You will have SIX diagrams total – 2 for the Onion Root Tip (low & high power), 2 for the letter “e” (low & high power) and 2 for the magazine (low & medium power).

**ANALYSIS AND CONCLUSIONS**

1. Why do you place one hand under the base of the microscope as you carry it? ·

2. How is the image of an object seen through the high­ power objective different from the image seen through the low-power objective?

3.How does the position of the letter "e" as seen through the microscope differ from the way an "e" normally appears?

4. Explain why a specimen to be viewed under the microscope must be thin.

5. Why should you never use coarse adjustment when focusing the high-power objective lens?

6. When you moved the slide left, in which direction did the letter “e” move?

7. When you moved the slide up, in which direction did the letter “e” move?

8. Suppose you were observing an organism through the microscope and noticed that it moved toward the bottom of the slide and then it moved to the right. What was the real direction that the specimen moved?

9. What did you see when the magazine was viewed under medium power?

10. What is the difference between resolution & magnification?